A COMPARATIVE REVIEW OF INFORMATION TECHNOLOGY MANAGEMENT PRACTICES IN SELECTED STATE GOVERNMENTS

This contractor document was prepared by an outside contractor as an input to an ongoing OTA assessment. It does not necessarily reflect the analytical findings of OTA, the Advisory Panel, or the Technology Assessment Board.

Prepared for
The Office of Technology Assessment
by
John C. Kresslein
Research Analyst

Project Report: PR-84-14
(K-84-20)

Donald A. Marchand, Ph.D., Director
The Institute of Information Management,
Technology and Policy
College of Business Administration
University of South Carolina
Columbia, South Carolina
(803) 777 5766
December 1984

J932-41

TABLE OF CONTENTS

	PAGE
List of Tables	i
Executive Summary	ii-v
Acknowledgements	vi-vii
Chapter 1: Introduction	
Definition of Information Technology	1
Selecting the Sample	2
Developing the Survey Instrument	3
Chapter 2: Profiles of State Government Approaches to the Management of Information Technology	
California	5
Minnesota	13
Florida	21
Texas	25
Virginia	29
New York	33
South Carolina	36
Chapter 3: A Comparative Analysis of Information Technology Management Practices	
Planning	42
Operations	46
Training	47
Chapter 4: Conclusions: Implications for Information Technology Management in the Federal Government	52
Appendix 1 Opportunities for Further Research	60
Appendix 2 Survey Questionnaire	62
Footnotes	67
Bibliography	68

LIST OF TABLES

		PAGE
2-1	Chart Summarizing ISB Goals	14
2-2	Agency Funding Process for Data Processing Technology in Minnesota State Government	20
3-1	Summary of Information Technology Planning	43
3-2	Summary of Information Technology Operations	45
3-3	Summary of Information Technology Training	48
3-4	Summary of Information Technology Controls	50

EXECUTIVE SUMMARY

This report presents an analysis of information technology management practices in selected state governments. The focus is on approaches to strategic management in central state governments. The analysis is concentrated primarily in four major areas of importance: planning, operations, training and managerial and technical controls affecting agency decisions with respect to networking, hardware and software selection and application development.

The study concentrated on information technology management, rather than the broader concern of information management in state governments. Information technologies for purposes of this study are defined as data processing, telecommunications and office systems technologies.

Selecting the states to be included in the sample involved four (4) steps:

1. The establishment of selection criteria.

2. A review of the annual reports published by the National Association of State Information Systems (NASIS) entitled Information Systems Technology in State Governments.

3. A search for states which conformed to the selection criteria.

4. Confirmation of the sample with professionals in the field of information technology management.

There were two (2) basic criteria against which states were measured for purposes of deciding whether or not to include them in the sample:

1. The degree of management innovation.

2. The extent to which the diversity of innovation in the sample was representative of information technology management strategies in state governments.

States were selected according to how they measured against these criteria as determined by the author after having read documentary reports released by various states on their information technology management practices. The author also consulted various professionals with intellectual and professional interests in the field.

The states ultimately selected are believed to represent the diversity of approaches to IT management which is likely to find in a more comprehensive study of the fifty states. Included in the sample were California, Minnesota, Florida, Texas, Virginia, New York, and South Carolina.

Data were collected through numerous phone interviews and correspondence with senior executives in state governments responsible for information technology management. State officials generously provided relevant documentation, all of which is cited in the bibliography appended to this report. The report presents profiles of information technology management strategies in each of the seven states, a comparative analysis of the states with respect to planning, operations, training and controls. A special section summarizing trends in information technology management as represented by the sample and implications for federal policy is also included.

Advances in information technology are such that the lines of demarcation which have separated data processing, telecommunications and office systems are becoming less obvious. This has the potential for having profound implications for the separate and distinct management structures which have been built around data processing, telecommunications, and office systems technologies, respectively. The data suggest, however, that while there are numerous organizational and financial obstacles to be overcome in responding to the convergence of information technologies, it is possible to reconcile the realities of the marketplace with those of the state government and develop a coherent management strategy consistent with

appropriate political, organizational, financial and cultural characteristics. Thus, no single model of information technology management exists. Each state is assuming a posture consistent with circumstances in which it finds itself. The data supports the conclusion that many states in the sample are taking a pro-active stance toward information technology management and are moving toward managing information resources as well. Furthermore, there is a recognition among senior executives in state governments that information technologies, appropriately applied, can represent a cost-effective solution to a problem without having to add personnel. State officials recognize that information technologies and resources are tools which can enhance the quality of service delivery by improving the information and labor intensive operations of state government. Among the specific conclusions drawn from this study are the following:

1. The oversight of information technology planning and acquisition continues to be selectively centralized in certain state governments.

2. Most states in the sample have elevated responsibility for overseeing the planning and acquisition of information technologies to senior management levels in state governments.

3. Most state governments represented in the sample are not only managing the technology itself, but are beginning to manage information resources as well.

4. As micro-computers become increasingly popular, end users are assuming more responsibility for their own information processing; but at the same time, there is more concern about the quality and effectiveness of consolidated information resources serving multiple users in state governments.

5. Many states represented in the sample are beginning to look at data processing, telecommunications and office systems, not as separate technologies to be managed separately but as converging technologies to be managed in a more integrated fashion.

6. While it is not specifically evident from the data, one can infer from the data that state officials no longer look upon information technologies as tools to augment the activities of support staff; instead, while traditional transaction processing applications such as finance and payroll continue, information technologies can be expected increasingly to support the delivery of services.

7. States are responding to a variety of legal, political, geographic and technological constraints in devising models of information technology management that are most appropriate for them.

ACKNOWLEDGEMENTS

This report would not have been possible without the cooperation and assistance of a number of people representing the Federal Government, the National Association of State Information Systems, and each of the states included in the study. I have had the opportunity to talk with many of these people on several occasions, and each time I found them patient and willing to help me understand more completely the topic about which I was writing. To these public servants whose names follow I extend a debt of gratitude.

National Association of State Information Systems

Mr. Carl W. Vorlander

California

Mr. Steve Kolodney, Office of Information Technology

Mr. Harold Kneedel, Law Enforcement Data Center

Ms. Betty Reader, Department of Fair Employment and Housing

Ms. Charlotte Luallin, Department of Fair Employment and Housing

Florida

Mr. Mike Hale, Information Resource Commission

Mr. Edwin Levine, Joint Legislative Committee on Information Technology

Minnesota

Nancy Abraham, Information Services Bureau, Department of Administration

South Carolina

Mr. Ted Lightle, Division of Information Resource Management

Dr. Larry Hamilton, formerly of the Division of Information Resource Management and now an independent consultant.

New York

Mr. John Heinson, Division of Telecommunications

Mr. Peter Lynch, Division of the Budget

Mr. Paul Fisk, Division of the Budget

Texas

Mr. Charles Wintons, formerly with the Automated Information Systems Advisory Council

Mr. George Rutherford, Purchasing and General Services Commission

Virginia

Mr. Hal Moye, Department of Information Technology

Mr. Lee Watlington, Department of Agriculture and Consumer Services

I would also like to thank Dr. Donald A. Marchand, Director of the Institute of Information Management, Technology and Policy for his invaluable assistance and sharing with me his perspective and insight into the information technology and management practices of the federal and state governments. Of course, I am much indebted to Ann Brannon, Faye Henderson and Marjie Martens of the Institute staff who worked through numerous revisions of this report to prepare it in its final form.

Every attempt has been made to confirm the accuracy of the information in this report. Should there remain errors in fact or interpretation I accept full responsibility. Moreover, the views expressed in this report should not be interpreted as reflecting the opinions of the Office of Technology Assessment or the University of South Carolina.

CHAPTER ONE

Introduction

The purpose of this study is to investigate approaches to managing information technology in the state governments of selected states. The focus of this report is on information technology management strategies in each of seven states with particular attention to strategies the states have adopted for the planning and operation of data processing, telecommunications, and automated office systems in state government. These states have been selected for study because they reflect a diversity of approaches to the management of information technology.

Definition of Information Technology

Information technology (IT) for purposes of this study includes data processing, telecommunications and office systems. The analysis of management strategies will incorporate the various ways states have defined these technologies. The study focuses primarily on central state government.

The following chapters will highlight the management structures in each state. The emphasis in every state is on long-range planning at the agency level with responsibility for overseeing the planning process vested in a staff support agency reporting to the Governor or some central policy group. A variety of technical and managment controls are being exploited in most state governments in the sample for the purpose of focusing IT expenditures by agencies in directions that are consistent with the strategic focus of central state governments.

In the remainder of this chapter I will explain the research methodology employed. Analysis and conclusions are presented in subsequent chapters. Chapter 2 presents a summary of information technology management practices in the states. Chapter 3 offers a comparative analysis of statewide approaches to information technology management and explores the reasons why states have moved in the direction that they have. Conclusions from the preceding analysis and implications for Federal information technology management policies are reserved for Chapter 4.

Selecting the Sample

The seven states included in this analysis are defined as using diverse approaches to the management of information technology. The process of selecting the sample involved four steps:

1. The establishment of selection criteria.
2. A review of statewide reports entitled Information Systems Technology in State Governments published annually by the National Association of State Information Systems (NASIS).
3. A search for states which would conform to the selection criteria.
4. Confirmation of the sample with selected individuals in the field of information technology management.

There were two basic criteria on which states were evaluated for purposes of their inclusion in the sample:

1. The degree of management innovation;
2. The extent to which the diversity of innovation in the sample was representative of the innovations in information technology management in all the states. These criteria resulted from discussions the author had with Mr. Fred Wood of the Office of Technology Assessment.

Confirmation of the sample with selected individuals with expertise in this area was necessary because to rely on National Association of State Information Systems (NASIS) reports[1] alone for identifying states which conformed to the selection criteria was insufficient. The level of detail on each state to be found in the annual NASIS reports was inadequate for the need at hand. Furthermore, information included on the states in NASIS reports is supplied by the states themselves. Therefore, it was necessary to confirm what information was available in those reports with NASIS officials and appropriate officials in the state governments.

To ensure that a sample was representative would have required that a preliminary survey of all fifty states be done and a sample drawn on the basis of pertinent selection criteria. Because of the scope of this effort and because of rapid changes in state programs, the selection process which was followed is intended to take advantage of the expertise and insights of those working in the field of state government management of information technology. This advice was reinforced with an independent literature review, the results of which convinced the author that the seven states proposed to the Office of Technology Assessment for inclusion in the sample were as close to representative of the diversity of IT management strategies employed in the states as possible. The seven states finally selected were: California, New York, Florida, South Carolina, Texas, Minnesota, and Virginia.

Developing the Survey Instrument

A copy of the instrument appears as Appendix 1. The questionnaire is divided into four sections: Planning, Operations and Training, Controls, and General Comments. The section on Planning clarifies the nature of information technology planning in the states and the policies and procedures governing that process. Operations and Training focused to the extent possible on the nature of the uses to which information technology is applied in the states, responsibility for operations and the policies and procedures governing the training of IT users. Controls over the use and management of information technology focused on

any technical and/or managerial controls at either a central state or agency level. These include budgetary controls, control over acquisition of new systems or conversion of existing systems, security, and communications standards and protocols. In order to understand the political and organizational climate which characterizes state IT management, the "General Comments" section was included. Respondents were asked to identify those factors they believed most influenced the approach that their states have thus far taken to the management of information technology. Respondents were also asked to identify any other potential respondents in state government.

This report does not include a special section describing information technology procurement practices, although procurement is an important management function. Instead, where procurement oversight is exercised as a means of managing the diffusion of information technologies throughout state governments the author has recognized that role and incorporated procurement as a factor to be considered when discussing a state's overall management strategy.

The questionnaire was used as a probing device to generate responses from contacts in each of the states. Because states vary in their political and economic environment and organizational structure, some of the questions posed were more relevant to some than to others. Thus, by using the questionnaire as a probe, respondents were permitted to explain in detail the circumstances in which their own states find themselves, focusing on those dimensions of the study most germane to them.

CHAPTER TWO

Profiles of State Government Approaches to the Management of Information Technology

This chapter offers a descriptive analysis of IT management practices for each state in the sample. For each state a summary of the management structure for IT planning, operations, training and control systems is presented. A state by state comparison along each of the dimensions of planning, operations, training, and controls is reserved for Chapter 3.

CALIFORNIA

A. Planning

California emphasizes strategic planning for information technology at both the agency level and in central state government. The Office of Information Technology in the Department of Finance oversees IT planning by agencies and shares responsibility with the Department of General Services in shaping statewide policy for telecommunications. Information technology is defined as all computerized and auxiliary automated information handling, including systems design and analysis, conversion of data, computer programming, information storage and retrieval, voice, video, and data communications, requisite system controls, simulation, and all related interactions between people and machines. It is, therefore, broadly defined; and agencies include plans for data processing, personal computers, office systems, and telecommunications in their annual IT plans.

Agencies are required to submit annual updates of their IT plans along with their annual budget requests. This strategy facilitates the objective of strategic planning at the agency level at the same time it vests oversight responsibility for information technology expenditures in the Office of Information Technology. Requests for additional funding for information technology must be reviewed by the Office of Information Technology which evaluates the proposal in terms of the agency's IT plan. The Department of Finance makes the final decision on whether the request is sent to the legislature for consideration.

In conjunction with their request for funding for information technology, agencies submit the results of feasibility studies which document the costs and benefits of the proposed system. In doing the feasibility studies to justify funding requests for information technology and in conducting post-IT implementation reviews agencies can solicit the assistance of the Office of Information Technology. OIT is organized along four units which include policy planning and education, telecommunications, consulting support, and statewide oversight. The Consulting Unit assists agencies in preparing studies and addressing information management issues upon request; and one official in a small agency with a hardware budget of approximately $30,000 and three data processing systems employees reported that this assistance was especially beneficial to her agency and probably others of comparable size. Agencies conduct post-implementation evaluations of IT projects and those evaluations are subject to audit by the Department of Finance's Program Review Unit. Agency planning serves two primary functions in that it forces agencies to consider information technologies as tools to be exploited in the service of the agency's mission while at the same time providing the Office of Information Technology with a contextual basis on which to evaluate the agency's budget request and IT project proposals. This is consistent with the role that the state sees for IT in support of service delivery by state agencies, boards, and commissions. IT is seen as a set of tools which can make workers more productive while helping to control personal service costs to state government.

The Office of Information Technology is responsible for developing plans and policies consistent with its functional responsibilities including policy-making, promoting inter-agency coordination, reviewing agency budget and procurement requests, providing technical assistance, and promoting the use of IT where appropriate. In advancing the use of IT and in promulgating policies for IT use and management, OIT is advised by the California Forum on Information Technology (CFIT), an advisory group comprised of representatives from each Executive branch agency. Governed by an Executive Committee, the CFIT is organized along a committee system which includes standing committees on telecommunications, legislation, security and confidentiality, personnel and education, and innovation and demonstration. CFIT satisfies a legislative mandate for the creation of a "user committee." Yet, CFIT also facilitates the strategy adopted by OIT in its relations with end-user agencies. OIT sees its role as that of providing a policy framework within which agencies can apply information technology in the most appropriate manner to satisfy their information requirements. The degree of oversight and the extent to which OIT becomes involved in overseeing the planning and implementation of information systems depends on the level of expertise and experience an agency has with respect to information technology. CFIT provides an agency presence and expert advice into OIT's decision process thereby serving to heighten OIT's awareness of agency needs and concerns with respect to IT while at the same time serving as a communications link between OIT and executive branch agencies themselves.

The Office of Information Technology is responsible for coordinating telecommunications procurement with agencies and the Department of General Services. OIT and General Services have engaged in a coordinated effort in telecommunications planning, procurement, and technical assistance. Along with the Telecommunications Committee of the CFIT the OIT and General Services have developed a telecommunications plan for state government which calls for the state to construct a digital backbone telecommunications network linking ten locations around the state.

Additional areas beyond those discussed in which OIT has or is developing plans and policies: public access to non-confidential information held by state government; security; state data centers; personnel management issues including qualifications, testing and training; office automation including multi-user office systems providing word processing, electronic filing, mail and calendaring; and emergency communications.

B. Operations

Certain data processing operations are centralized in one of the state's three major consolidated data centers:

1. Teale Data Center which incorporates seven major state agencies and provides services to 150 state customers.

2. Health and Welfare Data Center which includes ten departments within the health and welfare program areas.

3. Justice Data Center which serves the Department of Justice and maintains a telecommunications network for all police agencies in the state.

Each of the data centers has its own communications architectures. Other data centers exist throughout the state but do not provide services to anyone but themselves. They are the Franchise Tax Board which processes tax forms; the Motor Vehicle Center with five mainframes for motor vehicle licensing data; the Department of Transportation, Board of Equalization and the Department of Water Resources. These are considered single-agency, dedicated-use centers and not data centers for the purpose of statewide policy.

OIT is responsible for policy governing the consolidated data centers and has addressed or is seeking to address, pending funding,

such issues as determining agency-data center assignments and contingency planning and disaster recovery.

Many state agencies operate their own information processing technology. Agencies have in-place substantial investments in information technology and are free to upgrade, redesign, or otherwise alter their operating strategies consistent with approved information technology plans. To facilitate the acquisition of personal computers OIT has developed a policy governing PC's functioning as stand-alone processors and PC's linked together and/or to a mainframe "if the networking or communication function is incidental to the primary purpose of increasing individual productivity."[2] This policy is designed to encourage agencies to adopt policies for the use and management of PC's, which, if approved by OIT, will simplify the agency justification process necessary to acquire PC's by permitting the agency to by-pass normal OIT procurement reviews for PC's.

The Department of General Services is responsible for providing telecommunications structures for voice, radio, and, to a limited extent, data transmissions.

The state is committed to using information technology to improve productivity in the delivery of public services as an alternative to adding personnel. For this reason the Office of Information Technology has given priority emphasis during the budget process to funding innovative uses of information technology. One example is the Automated Identification System in the Department of Justice which is designed to automate the manual process for identifying fingerprints, thereby permitting investigators access to 4.5 million subjects. The system promises a 98% accuracy rate, a reduction in the amount of time to identify a print from several days to a few hours, a reduction of ninety positions, and an on-going annual savings of $2,000,000. Subsystems will provide immediate access to 11,000,000 names and associated criminal records through an automated name-index file and a statewide "cold search" capability which will permit investigators to match latent

fingerprints taken from the scene of a crime against the prints of 1.5 million active criminal subjects.[3]

The Office of Information Technology is in the process of developing a policy for public access to non-confidential state-held databases through telecommunications and remote terminals. OIT is awaiting the second of two consultants' studies addressing the vulnerability of state databases to unauthorized access and related issues associated with providing direct public access.

OIT has studied the use of teleconferencing as an alternative to state travel. The results of that study suggest that, as yet, teleconferencing is not an economical alternative. OIT in conjunction with General Services is also studying the feasibility of telecommuting as an alternative work arrangement for certain state employees.

In the area of telecommunications, mention has already been made of the statewide backbone network. Establishing communications among only three of the ten locations around the state which will benefit from the network will satisfy 80% of the telecommunications traffic in state government.

C. Training

The state sponsors a variety of employee educational and training programs in information technology for state employees. The State Library sponsors a computer literacy program designed to improve the level of understanding among non-technical persons of information technology. The program combines traditional reading assignments with programmed instruction.

The Office of Information Technology and General Services have worked together through General Services' EDP Education Program to develop a training curriculum for personal computer users.

OIT's Consulting Unit will also provide assistance to agency managers in developing IT plans or in developing feasibility studies or post-implementation reviews.

D. Controls

The state employs a variety of managerial and technical controls to influence the acquisitions, use, and management of information technology in the agencies. The primary emphasis is on the use of controls to facilitate planning and innovative system development within agencies. Thus, the budget, IT planning and procurement review processes provide central state government with the means to oversee and encourage IT use in the agencies.

Agencies whose information requirements make necessary communication with one of the consolidated data centers must conform to the appropriate protocols.

E. General Comments

California has adopted a statewide strategy for information technology that is broad in terms of the scope of technologies covered and yet respects the integrity of agencies' current IT investments. The state is committed to a policy of using information technologies in all departments, boards, and commissions where they represent a cost-effective alternative to other means of handling information. The thrust of the approach embodied in the policies promulgated thus far by the Office of Information Technology has been to create an environment that permits agencies to pursue their own technology strategies consistent with the requirement for IT planning at the agency level.

The state is influenced in its statewide approach by a number of factors. The state is exploiting the level of investment in both the consolidated data centers and the technology already owned by agencies

themselves. The data centers especially represent major information resources for the state and when combined with those resources in the agencies including mainframes, minis, and micros, the information processing alternatives available to agencies are extensive. The state government and OIT as the overseer of IT use and management in the state, in particular, is taking steps to ensure that end-users take advantage of the best "mix" of information processing resources available.

The decline in the unit cost of information processing makes information technology available to consumers who might have no tradition of in-house processing whatsoever. Thus, the state is taking steps to encourage departments, boards, and commissions of every size to use information technology where it represents a cost effective alternative to other options.

California is influenced by the fact that it is home to a substantial part of the information processing industry. The state's goal is to maintain a competitive procurement environment that will allow agencies to procure hardware, software and related peripherals at the lowest cost consistent with their need to purchase equipment that is compatible with existing systems.

Finally, the state recognizes the need to maintain a central state government presence in those areas which cut across agency lines or in which more than one agency has an interest. Thus, there is a central policy focus with respect to security and telecommunications.

MINNESOTA

A. Planning

Minnesota Statute 1982, Section 16.90 authorizes the Department of Administration to design and maintain a master plan for information systems in the State. Within the Department of Administration responsibility for information technology management is vested in the Information Services Bureau (ISB). ISB is actively engaged in promulgating policies governing a broad range of management issues associated with the design and use of information technology in state government. These policies, which include ISB support for the SNA, state telecommunications network; operating languages in ISB mainframes, a general strategy for local area networking within the capital complex and networking for microcomputers, suggest a strategic direction for the state which is broad in its scope for information technology. ISB has identified eleven goals to ensure that the state is using appropriate technology consistent with the need to satisfy its information requirements. A summary of the goals appears in Table 2-1. The Information Services Bureau reviews all expenditures for information technology and establishes operational guidelines for ISB facilities used by executive branch agencies. Excluded from oversight are the legislative and judicial branches of state government, local governments and public colleges and universities. ISB in conjunction with the User Advisory Council, an advisory group consisting of representatives of user agencies, encourages planning at the agency level and will assist agencies in IT planning, but executive branch agencies are not required by law to submit information technology plans for review by ISB.

ISB consists of eight (8) divisions responsible for planning and operations and is the focus of information technology management in Minnesota state government. These divisions are:

TABLE 2-1

CHART SUMMARIZING ISB GOALS

GOAL/DESCRIPTION	RESULT
1. Ensure that all executive branch agencies maintain and refine information system plans.	Improved strategic and information systems planning by ISB and customer agencies, thus ensuring more effective use of technology.
2. Publish statewide strategic computer, telecommunications network, and office automation plans.	Customers, Governor, and Legislature assured that ISB understands and can meet coming demands for processing and data transfer.
3. Manage effective procedures for the approval, acquisition or development, maintenance, and auditing of information system components.	Clear, precise review and approval mechanisms will be applied uniformly and judiciously, leading to more efficient structuring and operations.
4. Provide policy makers and analysts with easy access to the state's data base.	End-users rely less on technicians for data access and aid.
5. Maintain an accurate and easily accessible inventory of state information resources and standards for data and equipment.	An environment where data, programs, equipment, and personnel are identified and shared.
6. Provide and promote high-quality cost-effective analysis, design, and programming services.	Customer satisfaction with accurate, on-time, in-budget system development.
7. Maintain centrally managed computer services customers view as reliable, efficient, easily accessed, and reasonably priced.	Adequate, responsive, reasonably priced computer services for customer agencies.
8. Provide a variety of technically sound telecommunications services and systems to state agencies at reasonable costs.	Customers satisfied with types and costs of services provided.
9. Communicate further with customer agencies and within DOA about plans, services, and costs.	Good relations and mutual trust with customer agencies. Espirit de corps maintained within ISB.
10. Recruit and/or develop quality data processing professionals within the executive branch.	Minimize the problem of maintaining sophisticated data processing staff.
11. Coordinate major telecommunication, computer, office automation, and information system strategies with other public agencies.	Sharing of plans and mutual understanding of problems with other governmental entities.

Source: Managing the Information Services of Minnesota State Government. Published by the Department of Administration, State of Minnesota, September 1983, p.28.

1. Application Services Division: Provides application system development resources for both new systems and modification of existing systems. The Division provides feasibility studies, systems analysis, design, programming and implementation of tested systems for executive branch agencies.

2. Facilities Management Division: Operates the centrally managed computer facility and provides teleprocessing and time sharing services, data processing services, technical support for central and distributed computer systems, and data entry services.

3. Planning and Support Division: Provides information planning and training support to ISB and executive branch agencies and provides administrative and financial services to the Application Services and Facilities Management Divisions mentioned above.

4. Telecommunications Division: Provides and manages voice and data communications for state agencies; audio; radio; and video systems; and state operator services and administers the state's emergency 911 telephone service.

5. Intergovernmental Information Systems Advisory Council: Consists of 25 members appointed by the Commissioner of Administration, representing state and local units of government. The Council awards supportive contracts for the development, implementation and growth of automated information systems within local government, promotes sharing of hardware and software, and promotes standardization.

6. Cable Communications Division: Provides general staff support to the Minnesota Cable Communications Board (MCCB), a seven-member regulatory body appointed by the Governor.

7. Records Management Division: Serves all state agencies and units of local government by coordinating and overseeing the forms management system, the state records system program, and state central micrographics services.

8 Data Privacy Division: Assists state agencies, political subdivisions, and the general public in interpreting laws germane to data privacy and public records. The Division also has rule-making authority under the Minnesota Government Data Practices Act.

In addition, ISB receives counsel from four advisory groups:

1. State Information Systems Advisory Council (SNAC): Consists of high level information systems managers from private industry.

2. User Advisory Council (UAC): Consists of assistant and deputy commissioners from agencies in the executive branch of state government. UAC gives user agency management the opportunity to voice concerns, to advise on policy, and to promote a unified direction in information processing growth and practices.

3. Systems Advisory Council (SAC): Consists of systems office supervisors from state agencies ("Systems offices" consist of the agencies' own data processing analysts and programmers. They advise on procedural and operational issues).

4. User Council on Office Systems (UCOS): Consists of word processing supervisors and office managers. The UCOS group advises ISB on issues. For example, the Council recommended career paths for word processing operators and promulgated guidelines instructing agencies to do their own needs assessments for word processing.

ISB, working with the User Advisory Council, promotes agency planning for information technology. ISB recognizes and tries to persuade agency managers that information is a valued resource which can help the agency personnel fulfill their mandates under the law. Thus, ISB tries to move agencies toward strategic planning for information technology linking IT planning to the business plan of the agency. To summarize:

1. There is no formal, single document which qualifies as an IT plan developed by ISB with which executive branch agencies must comply. Instead the strategic direction for the state is bound in a comprehensive series of policies and regulations governing ISB computing sites and the state supported network. These statutes, standards, guidelines, and the installation of state-supported technologies provide the parameters within which agencies develop their strategies for the use of information technology.

2. ISB recognizes that planning at the user level is in the interest of the line agency and tries to move agencies toward strategic planning for information technology through the User Advisory Council. Other advisory councils provide additional input into the ISB decision-making process while at the same time providing a communications link between ISB in the Department of Administration and other executive branch agencies.

3. Agencies are encouraged to plan for data processing, telecommunications, and office systems, and ISB is promulgating guidelines for planning, procurement, and security. ISB is currently working with a planning group to develop a process and a format for applications planning in the agencies. Recommendations for further action to improve information management in agencies were promulgated by the Governor's Blue Ribbon Committee on Information Policies in its report dated November 1984.

B. Operations

Responsibility for central data processing sites is vested in a central processing unit in the Facilities Management Division of ISB for data processing applications run on ISB mainframes. User agencies are responsible for their own hardware and software to run applications that are unique to them.

Telecommunications operations are managed by the Telecommunications Division of ISB. Four inter-related divisions within ISB deliver DP and telecommunications services: Applications Services, Facilities Management, Planning and Support, and Telecommunications.

Office automation in the form of word processing, shared logic systems, and personal computers exists in Minnesota State government. ISB has negotiated a standard contract which allows agencies to purchase PC's at a 30% cost reduction. Most users of word processing are clerical personnel, but the state's Department of Transportation (DOT) is an example of an organization which is implementing office automation from the top/down. DOT has implemented the Professional Office System (PROFS) which is used by the Commissioner of Transportation, Deputy Commissioner, Assistant Commissioner, Division Directors and Assistant Directors for electronic mail communications.

C. Training

The Information Services Bureau conducts all EDP training through its Training and Information Center. The Center, open since October 1982, contains dumb terminals connected to ISB's computer center, a TI-900 mini-computer, and personal computers. The Center provides training and advice on computer-based automation to both technical and non-technical personnel.

D. Controls

ISB has issued policies for EDP and word processing equipment, data confidentiality and security, EDP operations, personnel, and applications. These policies and guidelines and the statutes under which ISB operates provide the strategic direction for the state with respect to information technology. ISB promulgates and/or maintains a set of technical and procedural controls which affect the decisions governing the use of information technology. First, ISB maintains a central data processing site to service state agencies. ISB's communications standard for the data communications network enforces a technical standard with which agencies must come into compliance to operate in the networked environment. Secondly, ISB maintains control over the acquisition of data processing technology. All computer equipment (defined as all hardware which is primarily used to enter, transform, store, and retrieve data under the control of an application program) located within an agency site, with the exception of dumb terminals connected to the ISB network which are owned by ISB, is owned or leased by the end-user agency. User agencies also own or lease their own personal computers and word processing equipment (defined as a specialized set of EDP equipment, consisting of a hardware configuration and programming, designed to work with textual data).

E. General Comments

ISB is involved in the funding approval process for data processing systems in state agencies. Figure 2-2, the Agency Funding Process, illustrates the steps each agency in Minnesota state government must follow in order to obtain budgeting approval for information technology. ISB reviews all funding requests for information systems which agencies make to the Department of Finance as part of the biennial budget process. The Department of Finance presents the request with ISB's recommendation to the Governor where a decision is made whether or not to include the request in the Governor's budget. Agencies are ultimately responsible for demonstrating to the satisfaction of the Departments of Administration and Finance that the proposed system is cost beneficial and will support the information requirements of the agency's operations.

FIGURE 2-2

AGENCY FUNDING PROCESS
FOR DATA PROCESSING TECHNOLOGY
IN MINNESOTA STATE GOVERNMENT

STEP ONE	An agency proposes funding of an information system to the Department of Finance during the biennial budgeting process just as it would any other funding proposal. Unlike other investment proposals, ISB reviews the request and provides an evaluation.
STEP TWO	The Department of Finance presents the request and its recommendations to the Governor and a decision is made regarding inclusion in the Governor's budget.
STEP THREE	The agency seeks legislative approval for its funding. In addition, ISB makes a cumulation of all of the executive branch agencies' funding requests for information systems and presents it to the Legislature.
STEP FOUR	If the Legislature provides funding for development of an information system, the agency must then define the system in more detail and justify to the Commissioners of Administration and Finance that the system is cost-beneficial and will effectively meet agency needs (M.S. 16.955).

FLORIDA

A. Planning

In 1983 the Florida legislature enacted the Information and Technology Planning Act. The Act was the product of a two-year study by the Joint Select Committee on Electronic Data Processing of information technology management and operations in state government. One of the principal findings was the lack of emphasis given to IT planning in state government. Legislators discovered that there was, primarily, concern with controlling the acquisition of hardware rather than with planning for and managing information technology as a strategic resource. Based on this and other findings the legislature revised the Florida statutes thereby creating the Information Resource Commission (IRC). The IRC is the central planning and policy organ for information technology in state government. The Information and Technology Planning Act mandated a statewide planning process for data processing hardware, software, services, supplies, personnel, facility resources, maintenance, training, and related resources.

Consistent with its responsibilities as the central planning and policy organ in state government IRC provides instructional guidance for agencies in preparing information technology plans. IRC is responsible for reviewing and approving agency plans to insure technical feasibility, the validity of the methodology used to determine cost estimates, measurable benefits to be derived, and consistency of the plan with IRC policies.

IT planning is linked to the biennial budget process. Agencies requesting funding for information technology resources must cite the section of their approved IT plan where the resource is identified when requesting funding.

In preparing their agency information resource plans agency managers are encouraged to think in terms of application requirements as well as hardware. Managers developed profiles of each application representing relevant functions in the operation of that department. In addition, managers are encouraged to think in terms of the physical resources in the form of disk drives, memory upgrades, and office automation systems required to run needed applications.

The legislature recognized and the IRC has embodied the philosophy that information is a resource that must be managed. Thus, one of the goals in requiring agency level planning is to shift primary emphasis from controlling physical technology to managing information resources by application.

B. Operations

One of the conclusions drawn during the Legislature's two year study of electronic data processing (EDP) management and operations in state government was that the concentration of planning and operations responsibilities for EDP posed a potential conflict of interest for the agency singularly responsible for those functions. Therefore, the Information and Technology Planning Act separates responsibility for planning and operations. The IRC is not responsible for data processing operations. Each state agency retains primary responsibility for managing dp operations within its own organization.

The Division of Communications in the General Services Department is responsible for managing state government's network for voice. While some data are transmitted over these lines primarily reserved for voice, the state functions with twelve separate data networks which have been built around each of the major data centers. Examples include data networks for Motor Vehicles, Transportation, and Law Enforcement. The IRC has policy responsibility for data networking and has recommended a feasibility study for an integrated voice and data network for state government.

C. Training

The IRC is responsible for training and providing technical assistance to end-user agencies. The IRC has just completed the first full year of implementing the Information and Technology Planning Act so the training program is not yet fully operational.

The IRC does provide technical and managerial assistance to end-user agencies in preparing information resource plans for data processing hardware, software, services, supplies, personnel, facility resources, maintenance, training and related resources.

D. Controls

The IRC is responsible for a number of managerial and technical policies and procedures designed to emphasize information technology as a resource to be exploited in support of the agencies' objectives. The IRC is responsible for developing the guidelines to be used by agencies in preparing IT plans and for reviewing and approving plans once submitted. The Information and Technology Planning Act also empowers the IRC to review all information technology acquisitions by agencies to ensure the integrity of the agency plans. The Act authorizes the Executive Office of the Governor to withhold operating funds from an agency until the IRC certifies that a proposed acquisition is consistent with an approved IT plan.

The IRC is developing policies governing data communications. It has already promulgated standards for office automation to ensure compatibility among systems.

E. General Comments

Florida is in a period of transition, moving from a highly centralized management strategy to one that is more consistent with a philosophy that recognizes the strategic value of information technology

and resources and which recognizes the drop in the cost of computing which puts computing power directly into the hands of end-users. The current strategy is one which recognizes the need for central state government oversight in planning and policy development while retaining managerial and operational responsibilities in end-user agencies. This strategy is the product of a two year study by the State Legislative Joint Committee on Electronic Data Processing. The Committee's assessment of the state's strategy for the management and use of electronic data processing was itself the result of a concern among elected and data processing professionals that the state's current strategy had outlived its usefulness. Among the conclusions at the end of the two year study which served to support efforts to design an alternative management strategy for the state were the following:

1. State government put too much emphasis on controlling the acquisition of hardware at the expense of planning for and managing the information resource itself;

2. State government had centralized policy and regulatory authority in the hands of an organization also responsible for operating a large data processing center. The Legislative Committee concluded that this situation posed the threat of a conflict of interest and was inconsistent with the high powered, low cost computing technology available to end-user agencies. There was no one accountable at a senior level in the agencies for the management and use of the information resource. And there existed a need for statewide standards governing such issues as security, disaster planning, networking and office automation.

The Legislature responded with the Information and Technology Planning Act of 1983 which provided for the structural reorganization and statutory authority necessary to address the problems and shortcomings of the existing state management strategy in a changing technological environment.

Thus, the Legislature created the IRC comprised of the Governor who serves as the Commission Chair and all members of the Cabinet. Through the Information and Technology Planning Act the legislature also required each agency head or his designee to serve as the agency's information resource manager with responsibility for developing and implementing the information resource plan. This provision was included to ensure accountability for information resources at senior levels in the agency. The legislature failed to authorize additional funding to coincide with this added responsibility so some agencies have delegated the information resource management function to a staff level person rather than a senior executive.

TEXAS

A. Planning

The central management authority for overseeing information technology planning and policy-making is the Automated Information Systems Advisory Council. The council is composed of seven members from both the public and private sectors. The Governor appoints three members, the Lieutenant Governor and the Speaker of the House of Representatives each appoint two. The statute authorizing the creation of the Council grants it rule-making powers. Pursuant to that authorization the Council has adopted rules requiring all agencies with automated information systems to submit biennial plans for all such systems to the Council. Automated information systems is defined broadly to include data processing, communications networks and office automation technologies. The Council is not required to develop a Statewide Master Plan into which agencies must come into compliance. However, it is empowered to "adopt guidelines to aid state governmental bodies in making economical and efficient use of automated information systems, the computers on which they are automated, or related services. The guidelines shall include, but not be limited to, the areas of long-range planning, common data bases, networking, applications, shared software,

security, and disaster recovery. Moreover, through its rule-making power the Council is able to compel compliance. Council rules require agency plans to include:

1. A statement of the strategic objectives to be obtained through the implementation of the automated information system,
2. An explanation of the current technological environment,
3. An explanation of the assumptions and constraints which are built into the planning process,
4. A description of the decision and review process used by agency management, and
5. A schedule for the next two years of proposed acquisitions and major conversions of automated information systems.

The Council is required to make a report of its activities to the legislature. However, it alone is the policy-making authority for automated information systems and is designed to operate independently of the direct influence of the Executive branch and the Legislature.

B. Operations

The Council is not involved directly in any operations. Data processing facilities are operated by the 120 data processing departments in state government. Responsibility for data communications and voice communications rests with the Data Processing Directors and the Telecommunications Services Division, respectively. The Automated Information Systems Advisory Council does not assume planning responsibility for the State's PBX system.

In the area of office automation the Department of Human Resources has invested $30 million in a network called Wellnet. In addition, both the Legislature and the Governor's Office are using data processing technology to serve constituent requests for public information.

Responsibility for operating intercity telecommunications services for voice and data is vested in the Telecommunications Services Division of the State Purchasing and General Services Commission. This unit leases a telecommunications network from the telecommunications industry. Its responsibility rests solely in ensuring that this technology is available. End-user agencies own their own or lease their own modems, parts, and processors. When agencies want to purchase telecommunications equipment they can seek the advice of the Telecommunications Services Division, but that unit has no authority to initiate efforts to influence an agency's decisions in this area. Where central control does exist in the area of telecommunications it exists at the procurement end of the process. There is no automatic central state government involvement in the planning of an agency's telecommunications requirements.

The State has had two independent studies done to recommend alternatives to the present leased arrangement. One recommendation being made to the Legislature is for a backbone microwave network, a portion of which would be owned by state government.

C. Training

While the Council perceives that training end users in operating the various automated information systems is important it will not assume any direct responsibility for delivering training services. The Council is empowered to develop policies governing training in the case of data processing and automated office systems. However, those policies have yet to be developed.

D. Controls

A combination of managerial and technical controls are at the disposal of the Automated Information Systems Advisory Council. The Council is authorized to review all data processing budgets for every

agency classified as a "state government body," defined as any board, commission, department, institution, office, or other agency, including an institution of higher education, that is in the executive branch of state government. It also includes any such offices of the State Supreme Court, the Court of Criminal Appeal, a Court of Appeal, and the State Bar of Texas or other judicial agency.

The Council is also empowered to oversee all procurements depending on the budget of the agency and the amount to be expended. Procurement approval is ultimately the prerogative of the State's Procurement Commission but the Council provides advice on the size, capacity and other pertinent features of the system to be purchased. Prior to final approval any agency which wants to purchase any system at all must submit a justification statement to the Council. The procurement process including supporting documentation is designed to force agencies to think more strategically about their information technology expenditures. Finally, the Council is empowered to promulgate guidelines for disaster recovery and system security. Action on these is in progress. In the meantime, there are in place voluntary guidelines for disaster recovery published by the Texas Association of State Supported Computer Centers (TASSC), comprised of the Directors of the State's data processing centers.

No similar central state government planning influence is present in agency procurements of telecommunications equipment. The role of the Telecommunications Services Division is merely an advisory one.

The Division has no formal authority to merge agency procurements; and the only formal authority is vested in the Division which does the actual purchasing of the equipment.

F. General Comments

Texas represents a unique blend of strong policy-making and weak chief executive influence. The Automated Information System Advisory

Council can compel compliance with its rule-making powers and unlike its counterparts in the other states, it is not restricted solely to the executive branch. The Council has the authority to oversee and approve budget requests for information technology and shares a role in the procurement process. However, it is the rule-making power which enables the Council to enforce its policies and guidelines.

VIRGINIA

A. Planning

Virginia has developed a comprehensive Master Plan for data processing, telecommunications and office systems in state government. Developed by the Management Analysis and Systems Development Department (MASD) of the Secretariat of Administration and Finance in 1982, the plan was designed to position the state to take advantage of the divestiture of AT&T in telecommunications and the declining costs and increasingly powerful information processing tools on the market. MASD identified seven major goals, providing a strategic direction for the state and recommended strategies for achieving those goals at the agency level. Among the goals established at that time:

1. Improve the quality of policy and management decision-making through the appropriate application of information technology resources;

2. Improve white collar productivity through office automation;

3. Consider the value of information technology as a resource and make decisions to invest in new technologies or resources in light of the prospective return on investment as compared to other investment alternatives;

4. Maximize the use of available data processing and word processing resources including sharing resources among state agencies;

5. Minimize the costs of hardware, software and services wherever possible;

6. Improve the cost and operating efficiency of the state's telecommunications facilities; and

7. Improve the efficiency by which effective applications systems are developed.

Policies governing the management of information technology are the responsibility of the Department of Information Technology (DIT). DIT consists of three formerly separate organizations which have been reorganized into a single department: Department of Computer Services, Department of Telecommunications and MASD. The Department of Information Technology has both planning and operational responsibilities. The elevation of all automated information systems management responsibilities to a department level status reflects the state's commitment to information technology as a productivity support tool during the 1980's and beyond.

Agencies are required to develop annual information technology plans. The Department of Information Technology is responsible for issuing planning guidelines and reviewing plans once they have been submitted. The present guidelines require agencies to define their goals, prepare a synopsis of what information systems they currently possess and identify those systems they plan to develop.

B. Operations

The Department of Information Technology operates four mainframes, a Sperry 11/92, an IBM 3084 Q, Amdahl V-8, and an Amdahl V-5. Agencies

have the option of local processing on site and/or establishing communications links with a DIT data processing center.

All responsibility for telecommunications is vested in the Department of Information Technology. DIT operates the state government telecommunications system for voice and data.

The Department of Information Technology is marketing the Sperrylink office automation system to customer agencies. In order to test the productivity benefits of office automation the Department of Computer Services initiated a pilot project in 1983 involving thirteen of its senior managers and ten secretaries. The Department tested electronic mail, calendaring, electronic filing/retrieval, word processing, and data processing applications.

As a result of this project which tested the Sperrylink office automation system the Department realized actual gains of 15.4% in time savings for managers, 29% for secretaries, and a 212% increase in output resulting from word processing. On the basis of these results the Department of Information Technology is pursuing a program to implement office automation statewide. The Department's plan for office automation includes efforts to:

1. Continue testing the Sperrylink P1 software with the intention to include it as part of the Sperry operating environment at the Department of Computer Services (DCS).

2. Continue to use existing Sperrylink workstations for normal office operations.

3. Order additional workstations for staff members who will need access to the office system under the collocated environment.

4. Evaluate other products that potentially meet DCS requirements, including color graphics, universal workstation, PC capabilities, along with standard O.A. functions.

5. Develop requirements for micro-mainframe integration of application systems resident on DCS computers that are seen as likely candidates for integration with our office system.

6. Develop an Office Automation Steering Committee at DCS to continue the necessary review of procedures and make recommendations for new standard operating procedures.

7. Assist customer agencies in their development of office automation capability, with integration of their office systems with the DCS computer environment, and with OA technology education.

C. Training

The Department of Information Technology provides end-user training in data processing and office automation. The Department maintains a bank of training workstations for both the Sperry and IBM Systems. A staff dedicated solely to training provides instruction to both Department of Information Technology staff and agency customers.

D. Controls

The Department of Information Technology exercises procurement review powers over all data processing and office automation technologies. At the time this study is being completed the Department of Information Technology is completing its reorganization merging with it a formerly separate Department of Telecommunications. That department has been responsible for overseeing the procurement of all telecommunications equipment and will continue to do so once the reorganization is completed.

DIT is responsible for issuing standards for data processing. The two-tiered approach to data processing requires agencies which want access to DIT mainframes to conform to the communications standards.

The Department of Information Technology recognizes the potential for problems resulting from the proliferation of microcomputers in state government. DIT is completing a study on the subject and will be forthcoming with a PC policy.

E. General Comments

Virginia has responded to the convergence of data processing, telecommunications and office systems by merging three formally separate organizations which had formerly exercised planning and operations responsibilities in those areas. The state has established a strategic direction for information technology and committed itself to using information technology and resources as strategic resources to improve productivity. To that end the state has embarked on a program to support office automation in state government, issued standards and guidelines for data processing, provided end-user training, and initiated efforts to assist agencies with other management problems such as system security and data confidentiality. The scope of the Virginia management strategy is very broad in that it covers many management issues and is very centralized in both its planning and operations.

The approach Virginia has taken is driven by changes in the technology which made a fragmented management structure unworkable. At the same time there has been a recognition that in an age of declining revenues information technology represents an alternative to having additional personnel. To realize the benefits of information technology requires a coherent management strategy which takes into account data processing, telecommunications and automated office systems.

NEW YORK

A. Planning

Planning for data processing and office automation is required of agencies which must submit EDP office automation plans along with their annual budget requests to the Division of the Budget. Telecommunications planning is the responsibility of the Division of Telecommunications of the Department of General Services.

Planning for major information systems involving more than one agency or which involve personnel or finance issues is generally conducted through steering committees comprised of representatives of the relevant central management departments and user committees consisting of representatives of those departments interested in the system.

B. Operations

Operations are highly decentralized with central state government retaining an interest in standards for hardware and software in systems that affect more than one agency and/or financial or personnel management issues.

The Division of Telecommunications operates inter-city and intra-city LATA services.

C. Training

The Governor's Office of Employee Relations has been offering training for selected agency managers in the use and management of new information technologies for the past several years. The Office of General Services also offers a variety of video and interactive training courses in various phases of information management. The Governor's Office of Management and Productivity is beginning to supplement the training efforts of the Governor's Office of Employee Relations.

D. Controls

There are no centrally designated technical standards for data processing or office automation. Agencies are granted automony in their selection of EDP and office automation hardware, software, and internal networking facilities, and peripherals so long as the annual plan is

understood by the Division of the Budget to be reasonably justified and is consistent with the agency's overall mission.

E. General Comments

To understand the approach to planning adopted by New York it is necessary to understand the development of EDP in state government. During the 1950's and 1960's, a period of large mainframes, the State adopted strict centralized controls over the acquisition of mainframe computers. Such central controls vested in the EDP Unit of the Division of the Budget were abandoned in 1983 in favor of a policy that would grant user agencies more autonomy in developing EDP systems that would meet their needs. This shift in policy does not apply, however, to statewide systems involving more than one agency. The decision to grant more autonomy to end-user agencies in developing their own EDP and office automation systems is a product of the widespread diffusion of computer technology in state government which is manifested in a substantial investments in technology by individual agencies; the expertise on the part of individual agencies reflected in knowledge about their programs and the information systems required to manage those programs; and the rapid decline in the unit cost of computing. Rigid central control over EDP acquisition and development in the agencies is no longer justified.

Much of the responsibility for EDP and office automation planning resides in the user agency. The current policy is designed to take advantage of the program expertise in each department while protecting the substantial investments in information technology that already exist within departments. Thus, the Division of the Budget uses the annual budget process to review plans for hardware acquisition and software acquisition and development in light of the department's mission, the sense of direction as demonstrated in the annual agency plan, and the ability to the agency to articulate a logical and coherent approach to adopting technology in support of the agency's mission.

SOUTH CAROLINA

A. Planning

South Carolina is developing, simultaneously, both a technical and a management infrastructure to support the use of information technology in reducing personal service costs while improving service delivery. The technical infrastructure is grounded in the statewide backbone micro-wave network and the technical standards for office automation and data processing developed by the state's Division of Information Resource Management. Consistent with a management strategy that takes a comprehensive view of data processing, office systems and telecommunications technologies, the Office of Information Resource Management of the Division of General Services (now reorganized as a separate Division of Information Resource Management) has developed a statewide Master Plan for information technology which is designed to position the state to take advantage of convergence of information technologies.

DIRM has responsibility for overseeing the planning and acquisition of all automated information technologies including data processing, telecommunications and office systems. DIRM reviews all information technology plans submitted by agencies annually. DIRM requested line agency input into the Statewide Master Plan through the agency planning process. To encourage agency input DIRM developed a planning manual which recommended but did not mandate a planning approach. Agencies were requested to submit three-year plans by September 1982, which would then be updated every year thereafter. The requirements of the Consolidated Procurement Code enacted by the South Carolina General Assembly in 1981 mandate that agencies develop their own information technology plans which would then be fed into the State's Master Plan. DIRM took a participative approach to developing its own Master Plan and supplemented the request to agencies with a planning manual to guide agencies in their planning process.

B. Operations

DIRM is constructing a state-owned microwave network that will form the backbone of a shared communications network for voice, data and video facilitating agency access to data centers around the state and supporting office automation statewide. The network is designed as an integrated network to carry voice, data, video, and radio transmissions simultaneously. The system which will consist of thirty-seven towers is being built around the eighteen microwave towers which are already in place and are used for one-way transmission and broadcast by South Carolina Educational Television (SCETV). The system which will be completed by 1986 will serve all state agencies and is expected to save over $100 million over the next twenty years. Construction of the microwave network will reduce the dependency of the State on intercity Education Television (ETV) video systems currently leased from the telephone industry. With Instructional Television Fixed Service (ITFS) Systems, the state will replace the intra-city ETV cable distribution system currently leased from the telephone industry. At the same time the network will allow economical communications among the state's sixteen major data processing centers. The microwave system will facilitate communications among data centers, permitting transmission, exchange and sharing of text and data, thereby supporting office automation statewide.

In the area of office automation, the Office of Information Resource Management, originally part of the Division of General Services initiated the Office Productivity and Automation Project during the Fall of 1981. Since then there have been three evaluations of the first phase of the project, a pilot study of office automation in three departments within the Division of General Services. The second phase of the project called for the expanded use of office automation in state agencies. The Office Automation Section of the Division of Information Resource Management provides technical and management assistance to managers in other agencies who want to invest in office automation.

To date, office automation has been installed at four sites within the Capitol Complex including Wang processors initially designed for the Legislative Printing System but to which office automation features have since been added. The Legislative Services Group, an arm of the State Legislature, uses two Wang VS 100 processors which support over two hundred terminals. Terminals, which have been in place since February 1982, are distributed among House and Senate member offices; and members and staff have access to terminals and printers located on the floor of the House and the Senate chambers. The system prepares legislative journals, calendars, bills, and amendments, and tracks all bills and amendments through the legislative process. Members have direct access to word processing, data processing, and key word search, which provides up-to-date information on any bill and direct access to the South Carolina Code of Laws.

DIRM has also provided assistance in implementing IBM 8100 systems in three sections of the Office of the Governor. Other installations which are part of or soon to be part of the office automation network in the Capitol Complex include the Executive Director of the Budget and Control Board, the Health and Human Services Finance Commission, the Department of Agriculture, the Division of Human Resource Management, Department of Social Services, the Office of the Secretary of State, Department of Insurance, the Division of General Services, and the Division of IRM.

Personal computers are fast becoming a primary information processing tool supporting managers and professionals in State Government. DIRM does not want to preclude agencies form investing in these low cost, high powered tools and is committed to a goal of enhancing local control over information processing. At the same time, DIRM has expressed concern that PC's, which are becoming a popular office automation tool, conform to state standards for office automation for the purpose of document transfer and sharing. To accommodate the influx of PC's while adhering to the goal of local control over information processing the Division of IRM has purchased a software package providing English-language like query capability and downloading of data from

the DIRM mainframe to the local PC. DIRM is one of sixteen data centers in state government. Plans are to link PC's to the mainframe using leased lines or dial-up lines. This approach will permit end-users controlled access on a pre-authorized basis to state government databases.

C. Training

In June 1981 the State Legislature enacted the Consolidated Procurement Code which consolidated authority for overseeing the procurement, management and use of information technology in the Division of General Services. Since a major reorganization of General Services this authority is now shared by the Division of Information Resource Management. The Division of General Services was authorized to provide in-house training to State employees who are working with office automation technologies and other computer-based technologies. DGS created the Research and Training Unit to provide training. The Unit is equipped with its own training staff and facilities including IBM 8775 terminals as well as personal computers of various types.

The Legislative Services Group providing office automation capabilities to the State Legislature also provides training to members of the Senate and House of Representatives. The training consists of introductory instruction to members and user support on an "as needed" basis.

D. Controls

Pursuant to its powers authorized by the Consolidated Procurement Code the Division of Information Resource Management has promulgated technical standards for office automation.

DIRM exercises initial review authority over all IT purchases proposed by state agencies. If the proposal is compatible with state technical standards, the State Master Plan, and is reasonable in the

context of the agency's functional needs, it is forwarded to DGS for competitive bidding procurement.

South Carolina has taken major steps in acquiring, using and managing information as a strategic resource. To support the implementations of IRM statewide the Division of Information Resource Management has made available to senior executives in state government a manual entitled A Manager's Guide for Implementing Information Resource Management (IRM) In A State Agency. The Guide is written in a non-technical style for the lay person just beginning to introduce himself to the information management function. The manual describes the evolution of information management; advises the reader on critical organizational, human, financial and other factors to be considered when implementing IRM; and recommends strategy for initiating an approach to information resource management consistent with the characteristics of the organization. A number of state agencies have begun reorganizing along an information resource management (IRM) model, vesting responsibility for managing data processing, office systems, and telecommunications in a single department managed by a senior executive in the agency. The State's Division of Human Resource Management has contributed to this effort by approving an agency level IRM Director position series in the compensation and classification codes.

E. General Comments

State government has employed a variety of technical and management standards to encourage agencies to focus on the strategic value of information resources to be used in support of the agency's mission. Among them:

- the oversight authority granted DIRM in the State Procurement Code;
- the promulgation of communication standards for office automation and data processing;
- the statewide Master Plan for Technology into which agencies have had input;

- the IRM director series for agencies authorized by the Division of Personnel;
- the participative approach taken by DIRM in encouraging and working with agencies in developing strategic plans to meet statewide and agency needs.
- development of a technical infrastructure focused on establishing a communications network to enhance and facilitate central state government and agency ability to access, exchange, and share data and other technical and human resources.

In addition, the University of South Carolina's Institute of Information Management, Technology and Policy has contributed to this effort through its research, publications, and consulting activities. The Institute has had a close working relationship with the State Budget and Control Board and has been the principal resource for the Board in addressing the numerous management and policy issues associated with the State's initiatives in this area. The Institute has conducted every major related study for the Board beginning with a significant report in 1981 identifying serious deficiencies in the State's approach to managing telecommunications, data processing and office systems. Since that time, the Institute has supported state government with management policy assistance in helping individual agencies develop information resource management plans. They include Midlands Technical College, the South Carolina Tax Commission, the State Development Board, South Carolina Department of Mental Retardation, Department of Social Services and the Health and Human Services Finance Commission. The Institute continues to play a key role as a source of consulting research support, as well as helping to use University resources to assist state agencies to improve the management of information resources.

CHAPTER THREE

A COMPARATIVE ANALYSIS OF INFORMATION TECHNOLOGY MANAGEMENT PRACTICES

The previous Chapter provided a state-by-state description of information technology management in the states. This chapter will serve to present on analysis of each management issue as it is addressed across the state sample.

1. Planning

Figure 3-1 presents a summary of the planning issues as they are addressed in each state. For the most part information technology planning occurs at the level of the end-user agency under the supervision of a central oversight authority.

a. Organizing the Planning Function

There is no single model for information technology planning. Two states, Virginia and South Carolina have organized separate departments at senior policy levels in state government. California, Virginia, New York, Minnesota and Florida use the budget process to encourage agency planning. Texas and Florida have created separate commissions with powers to formulate a broad range of policies governing information technology. Minnesota vests responsibility for setting a strategic direction for the use of information technology in state governments in the Commission of Administration under the direction of an Assistant Commissioner of the Information Services Bureau (ISB).

b. Statewide Strategy

Two states, Virginia and South Carolina, have adopted state master plans for information technologies including data processing, office

FIGURE 3-1

MANAGEMENT ISSUES:

ORGANIZING THE PLANNING FUNCTION

CALIFORNIA	NEW YORK	FLORIDA	SOUTH CAROLINA	TEXAS	VIRGINIA	MINNESOTA
Office of Information Technology in Department of Finance	Central oversight for planning for systems affecting more than one agency or personnel or financial management; Office of Telecommunications. General Services is pursuing telecommunications planning in absence of legislative mandate	Commission composed of Governor and Cabinet Office	Division of Information Resource Management of State Budget and Control Board	Automated Information Systems Advisory Council consisting of members of public and private sectors, appointed by Governor and legislature	Department of Information Technology	Information Systems Bureau of the of the Commissioner of Administration
			STATEWIDE STRATEGY			
Strategic Plan for Telecommunications; Statewide Strategic data processing	Strategy for EDP planning by agencies	Statewide strategy for dp, telecommunications	Statewide pan for dp, telecommunications, office systems	Strategy for planning and policy development	Statewide strategy for dp, telecommunications, office systems	Statewide strategy for dp, telecommunications, office systems
			AGENCY LEVEL PLANNING			
OIT oversees agency plans submitted to Department of Finance along with budget requests	Division of the Budget reviews agency EDP plans submitted with annual budget requests	IRC reviews agency plans which must be submitted if agency is going to request funding for IT resources	DIRM reviews agency IT plans submitted annually	AISAC regulations require biennial IT plans	CIT reviews agency plans submitted annually	ISB works with its User Advisory Council to encourag agency planning
			SCOPE OF PLANNING			
DP, OA, Tele	DP, OA	DP, OA, Tele	DP, OA, Tele	DP, OA, Tele	DP, OA, Tele	DP, OA, Tele

automation and telecommunications. One state has adopted a strategic plan for telecommunications only.

However, the absence of a state "master plan" should not be interpreted as suggesting that states are failing to take a strategic focus with respect to investments in information technology. The existence of a Master Plan merely suggests that a state has documented its strategic direction in a single source. Other states, especially California, Minnesota and Florida, are also thinking strategically, providing a management framework within which agencies can plan and operate, the boundaries of which consist of regulations, guidelines, and standards promulgated by a central policy group.

Telecommunications planning is one area where central state government can play a pivotal role because it can act as a coordinating influence for the fragmented data processing operations in state governments. Thus, South Carolina is constructing a microwave network to provide unified data, video and voice communications and shared networking capabilities for agencies in state government; and New York is considering a similar option for its Emerging Disaster Preparedness Program. California plans to construct a digital backbone telecommunications network, and a network has been proposed for the State of Texas as a more economical alternative to its present system leased from the telecommunications industry.

c. Agency Planning

Most planning occurs at the agency level under the supervision and guidance of the state's central management authority. It is required in all states except Minnesota where the Information Systems Bureau works through the Users Advisory Council to encourage planning for technology and applications development. In most cases agencies are encouraged to consider all of their information technology requirements in an integrated fashion.

d. Scope of Planning

States have responded to the convergence of technologies and begun to require that agencies consider information technologies as a single resource encompassing data processing, telecommunications and office systems.

Figure 3-2

SUMMARY OF INFORMATION TECHNOLOGY OPERATIONS

MANAGEMENT ISSUES

DEGREE OF CENTRALIZATION OF OPERATIONS RESPONSIBILITIES IN STATE GOVERNMENT

CALIFORNIA	NEW YORK	FLORIDA	SOUTH CAROLINA	TEXAS	VIRGINIA	MINNESOTA
Multiple data centers serving numerous agencies; substantial investment in IT in end-user agencies	Very decentralized; substantial investments in IT in end-user agencies	Decentralized in agencies; nine agencies share a DP utility	Consolidated Data centers; substantial IT investments within agencies	Decentralized	Dual strategy; Decentralized except for telecommunications which is the responsibility of the Department of Information Technology; DIT operated mainframes	Combination of centrally managed dp sites and distributed processing in the user agencies
			OPERATIONS AND PLANNING			
Separate	Separate	Separate	Separate units within Division Information Resource Management	Separate	Separate units within Department of Information Technology	Separate units with Information Systems Bureau

The lone exception is New York where the Budget Office reviews plans for data processing but no others.

2. Operations

A summary of operations in the states is presented in Figure 3-2.

a. Centralization of Information Technology Responsibilities in State Government

As one would expect data processing operations is a local end-user responsibility, although states do operate numerous data centers to serve multiple agency needs in particular functional areas. For example, California's Health and Welfare Data Center serves ten state departments within the health and welfare areas. If there is one area in which states have sought to centralize control over operations it is in telecommunications. South Carolina is moving steadily in this direction by supporting shared communications networking between agencies and consolidated data centers. Virginia vests all responsibility for telecommunications planning and operations in the Office of Telecommunications which has been reorganized under the State's Department of Information Technology. Other states including California and Texas are considering or have developed plans for state owned or leased backbone telecommunications networks.

b. Operations and Planning

Three states subsume limited responsibility for data processing and telecommunications operations within a single parent organization responsible for planning as well. Otherwise, planning and operations are separate functions allocated to separate groups within state government.

There appear to be three major reasons for this approach. First, state agencies, particularly larger agencies in states like California and

New York, have a tradition of data processing on which to build current investments in information technology. States are not going to abandon this approach to operations which has enabled agencies to tailor their automated information systems to satisfy their information processing requirements. Secondly, the proliferation of microcomputers in the organizations placing computing power directly in the hands of end-users is simply contrary to the notion of central control. To realize the productivity potential of the microcomputer end-users must be free to develop their own applications as required by their information needs. Where central state governments can play a significant role in the use of the microcomputer is in the networking arrangement when central state governments supporting a telecommunications network require agencies to conform to communications protocols if they choose to participate in the network for data transmission or for office automation functions such as document sharing a distribution or electronic mail. Third, states are anxious to provide agencies with as many alternative technical solutions to satisfy their information requirements as possible. Thus, they are reluctant to restrict agencies to the one or two alternatives supported by the same organization which is responsible for assisting in the development of and/or reviewing agencies plans for information technology. The assumption of such dual roles is seen in a number of states as a conflict of interest.

3. Training

Figure 3-3 presents a summary of the principal management issue associated with training: Location of Training Responsibility.

Training is recognized as critical by every state, but states vary in their approach to this vital function. One state incorporates responsibility for IT training in other state employee training programs. Another

Figure 3-3

SUMMARY OF INFORMATION TECHNOLOGY TRAINING

LOCATION OF TRAINING RESPONSIBILITY

CALIFORNIA	NEW YORK	FLORIDA	SOUTH CAROLINA	TEXAS	VIRGINIA	MINNESOTA
State DP Education Program operated by General Services, in conjunction with Office of IT; State Library	Shared by Office of Employee Relations and Office of General Services. General Services has training center for EDP management and operations	Information Resource Commission [1]	Division of General Services	Automated Information Systems Advisory Council has policy making responsibility for training, only. No direct training responsibility	Department of Information Technology	Training and Information Center in the Information Services Bureau

[1] Florida's Information and Technology Planning Act of 1983d vests responsibility for end-user training in the Information Resource Commission (IRC). State government is in a period of transition with respect to its management strategies; and since its creation the IRC has been primarily involved in advancing IT planning in state agencies.

merely absolves central state government of any responsibility whatsoever. Two others vest responsibility for designing and delivering training services to the same group as that responsible for IT planning. Minnesota, South Carolina and Virginia have, in operation, special facilities dedicated to training in the use of data processing and office systems technologies.

4. Controls

Figure 3-4 presents a summary of pertinent control issues. The states have adopted a variety of measures to insure a more coherent approach to information technology use and management as the descriptions in Chapter 2 will attest. However, prominent among the means of control are the budget review and procurement approval processes. Central state government IT management authorities are also empowered to issue guidelines for IT management.

a. Investing in Information Technology As An Alternative to Escalating Labor Costs

States are interested in controlling the growth of state government in terms of reducing the numbers of employees and associated costs. Information technologies are seen as appropriate remedies to satisfy information requirements while foregoing the need to add personnel when technical solutions are feasible and cost/effective. Most states in this sample link planning for information technology to the agency budget planning process. All states rely additionally on procurement review for controlling IT expenditures.

By far the more significant control mechanism, though, is the up-front linkage of IT planning and budgeting oversight. It is during this phase that agency managers and senior executives are considering various alternatives to technical problems. It is during this phase that the decisions are made concerning such issues as the utility and/or technical feasibility of a proposed system or whether to develop one in-house or utilize the services of a consolidated data center.

Figure 3-4

SUMMARY OF INFORMATION TECHNOLOGY CONTROLS

Control and IT Expenditures

CALIFORNIA	NEW YORK	FLORIDA	SOUTH CAROLINA	TEXAS	VIRGINIA	MINNESOTA
Budget Process, Procurement Process; Feasibility studies and post-implementation evaluations	Budget and Procurement process	Procurement Process, Budget Process	Procurement Process DIRM works with Budget and Control Board and House Ways and Means Committee in responding to agency functioning requests for IT	Budget Process, Procurement Process	Procurement Process, Budget Process	Central control over all systems primarily through through the procurement process, although ISB does review IT budget requests from executive branch agencies
			IT POLICY GUIDELINES			
Office Information Technology	Division of the Budget, Office of Telecommunications	Information Resources Commission (Developing policy on communications)	Division of Information Resource Management; Division of General Services	Automated Information Systems Advisory Council	Department of Information Technology	Information Systems Bureau

Thus, by requiring review of agency IT budgets, however, states are not only attempting to control costs but are also attempting to ensure that agencies are thinking strategically about their information technology requirements. That is, states are requiring that agencies diagnose their technology needs and evaluate the most cost effective alternative to meeting those needs.

b. IT Policy Guidelines

Six states have empowered IT planning agencies to issue guidelines for end-user agencies. The Automated Information Systems Advisory Council in Texas is capable of enforcing its policies and guidelines through its rule-making authority. Other states seek a combination of budget and/or procurement review process to influence agencies to enforce central state government policies and guidelines.

Policy guidelines are significant because they provide the parameters or framework within which agency managers and senior executives are able to make critical decisions governing planning and investment for information technologies. Thus, policy guidelines promulgated by a senior policy authority in central state governments are defacto state plans because it is through these policy guidelines that the states express their strategic directions for information technology.

The range of topics with which policy guidelines are concerned include all of the relevant management issues associated with the use and management of information technology. Thus, states have developed policy guidelines for contingency planning and security of hardware, software and data; office automation; networking; personal computing; and data sharing.

CHAPTER FOUR

CONCLUSIONS: IMPLICATIONS FOR INFORMATION TECHNOLOGY MANAGEMENT IN THE FEDERAL GOVERNMENT

Advances in information technology are such that the lines of demarcation which have traditionally existed between separate technologies are being breached. This has profound implications for the formerly separate management structures which have been built around each technology. State officials are reconsidering the fragmented approach to information technology management that has characterized information technology management in state governments, the federal government, and private businesses. This reconsideration reflects a recognition that information resources and technologies are tools to improve the information and labor intensive operations of state governments.

In many states personal computers and word processors in both stand-alone and networked environments are providing employees with direct access to on-site computing power. Where consolidated data centers exist in state government states are not abandoning them in favor of microprocessors in the hands of end-users. Instead, the penetration of the microcomputer adds an additional layer of computing power available to end-users. Thus, it makes no sense to discuss the concentration or distribution of computing power or to otherwise discuss DP operations as either centralized or decentralized. Similarly, states are not centralizing all management responsibility in a single central state government authority. Instead, states are structuring a management framework which permits departments, boards and commission as much latitude as possible to tailor information systems according to their unique requirements, consistent with an overall state strategy as manifested in the state master plan as defined by major investments in statewide telecommunications networks and/or policies, rules and guidelines. However, not all states have chosen to respond to the convergence of technologies in the same manner. Political traditions, the

magnitude of the geographic area to be covered by management apparatus of a state government, and major investments in existing systems have prevented most states from centralizing total control over information technology management, operations, and planning. This study has focused on the management structures in place in central state governments which are in the process of being developed. Every state included in this analysis is confronting an uncertain technology environment and diverse organizational frameworks. It is for these reasons that no single model of IT management exists, although patterns of oversight are emerging. Each state is responding to the particular circumstances in which it finds itself.

For these reasons, I have drawn upon seven themes which emerge from the preceding discussion and around which I will present conclusions and the implications they have for government high technology policy.

1. Oversight of Information Technology Planning and Acquisition Continues to be Selectively Centralized in the States.

State Governments are responding to a variety of economic, market and political stimuli and realizing that the distribution of computer power into the hands of end-users demands a coordinated effort by a central state government authorities to oversee IT planning and procurement by agencies. Many states already have a tradition of selective oversight of information technology planning and/or procurement especially in the area of data processing. State governments have also exercised control over planning and operations of telecommunications, although responsibility for this technology has usually been vested in a separate department, usually of General Services. What is emerging now, however, is the recognition of planning responsibilities for data processing and telecommunications, and, to a lesser extent, automated office systems. California, South Carolina, Minnesota, Virginia, Texas, and Florida have centralized at least planning responsibility for all information technologies in a single agency.

State governments have recognized as has the federal government, that there is a need for policies and guidelines governing the use and management of information technology. In addition, the federal government and

certain states, including South Carolina, Florida, Virginia, as well as California and Minnesota have recognized the strategic value of information resources and technology. These states are taking a proactive posture towards the management of these resources as evidenced by this report. The federal government has also placed itself among those who have taken a proactive stance. The Office of Management and Budget (OMB) has released a draft of its circular dealing with the management of federal information resources. This circular represents OMB's commitment to implement those provisions of the Paperwork Reduction Act of 1980 concerning general information policy, information technology, privacy and the maintenance of federal records. This OMB circular in conjunction with similar policies and activities in certain state governments is evidence that the information resource management (IRM) concept is being implemented as a management strategy in the federal government and in selected states.

The General Services Administration has established guidelines for purchasing of EDP equipment but, like their State counterparts, GSA officials recognize that they do not have the expertise to second-guess line-agencies with respect to type of system being procured. Furthermore, by the time a department is ready to purchase a piece of hardware or software, critical decisions governing the nature of the system's use, its feasibility, or whether or not it offers an appropriate solution to the problem at hand have already been made. Thus, the procurement process alone contributes little value to the strategic focus of departments, boards and commissions in search of technically feasible, cost/effective solutions to satisfy their information requirements.

2. <u>States Have Elevated Responsibility for the Oversight Function to Senior Policy Levels in State Government</u>.

In recognition of the degree to which states are seeing information technology as a valuable tool in support of service delivery states have vested responsibility for information technology policy at the highest levels of state government. From this level of influence central state government authorities are in a better political position to enforce

statewide policies and standards governing the planning, acquisition, networking and use of information technologies.

The Federal government has elevated responsibility for IT management as well. The experiences of the states in the sample suggest that those which have elevated management responsibility and have been active in implementing legislative mandates with respect to planning and policy develop can influence the allocation of information technology resources. Moreover, those resources can be allocated according to essential information requirements as defined by line personnel responsible for service delivery who are involved with middle and senior managers in defining the agency's IT strategy. Clearly, the lesson to be learned is that mere restructuring of the organization is insufficient to bring about the desired changes with respect to the use and benefits of information technology. State governments must emulate the pro-active posture of the federal government and selected states in this sample in order to realize the true productivity potential, defined either quantitatively or qualitatively, that low cost, information technology has to offer.

3. State Governments are Moving in the Direction of Managing, Not Just Technology, But Information Resources As Well

The data provided in this study suggests that the first step in developing a coherent management strategy for information resources is to gain management control over the technology. The Federal Government has attempted to do this through the Brooks Act of 1965. Later efforts to manage information as a strategic resource were reflected in the Paperwork Reduction Act of 1980 and continue to be reflected in the recently released OMB circular. Several states in this sample are beginning to move in the direction of managing information as reflected in preliminary efforts to oversee the development of new applications and to make available public records. They are joined by the Federal government which is moving to implement the information resource management (IRM) concept pursuant to provisions of the Paperwork Reduction Act.

The experiences of the states in this sample are testimony to the claim that any strategy that will eventually lead to information management begins with addressing the management issues associated with the technology itself. Furthermore, the move toward information management is not necessarily directed, in all cases, by central state government. While central state government can stabilize a policy framework for information management, line department boards and commissions in state government are responsible for addressing their information requirements and planning for applications to meet those requirements.

4. Control of Technology Resources is Increasingly Distributed Into the Hands of End-Users, and at the Same Time There Is More Concern About the Quality and Effectiveness of Corporate-Wide Information Systems

There is no question but that states maintain consolidated data centers as one component of their overall information processing strategy. Yet, in addition to this degree of technology control, end-user agencies continue to provide for their own information computing and processing needs. This trend is becoming more acute as the cost of computing continues to decline and the acquisition of microcomputers becomes an even more attractive alternative to other computing solutions. In fact, the technology environment which state policy-makers must address is rapidly approaching not one or two, but three levels of computing solutions for end-user agencies: the consolidated data center serving multiple user agencies; the in-house data center; and the micro-computer.

The advent of the microcomputer is forcing states and the Federal government to develop management policies for security, confidentiality, end-user training, procurement and networking that will protect the integrity of the data and ensure its compatibility and the privacy of citizens, but will not restrict end-use access to the microcomputer alternative while at the same time enhancing the utility of the micro as a partner in the inventory of available technological solutions.

5. States Are Taking an Integrated Approach to IT Management

In response to the convergence of the technologies as understood in the IT marketplace, states are positioning themselves to respond by taking an integrated approach to data processing, telecommunications and automated office systems planning. They are beginning to look at these technologies not as separate systems, but as integrated systems offering a total solution to their information technology requirements.

Furthermore, the experiences reflected in this study suggest that states will develop their planning and operations strategies for IT around their greatest strengths. Thus, Minnesota, California, Florida and New York are developing a strategy consistent with their investments in consolidated data centers. South Carolina is building its strategy around an integrated, backbone microwave network which will provide shared communications capabilities between agencies and sixteen data centers around the state. The state has also implemented a series of management initiatives including a separate Division of Information Resources Management of the Budget and Control Board and an IRM Director series in the personnel classification codes to facilitate the implementation of the IRM concept in state agencies. Virginia and Texas are developing trategies consistent with the traditions in those states.

6. Technology is Being Applied Increasingly to Support the Delivery of Services

Although the study was limited in the extent to which data could be obtained in IT applications, one can infer that states are moving away from using data processing technology for primarily traditional transaction processing applications such as finance and payroll. States are realizing the importance of information technology in controlling the growth of all operating and personal expenditures. And it is this realization in conjunction with anticipated reductions in state revenues and increasing demands for services that is encouraging developments in the expanded use of investments in information technology. While the traditional,

administrative support applications of IT will continue, the application of information technology for service delivery will become increasingly visible over time. It is at this level of use that the real productivity potential of information technology lies and federal policies should encourage states to take a more aggressive approach to managing their information resources.

7. In Designing the Appropriate IT Management Model States are Responding to a Variety of Constraints.

The states are responding to a variety of legal, political, geographic, and technological constraints which influence to a varying degree the nature of their responses to the need to manage information technology. They are:

a. The fact that the convergence of data processing, office automation and telecommunications is very dynamic because of changes in underlying digital and lightwave technologies.

b. The wide geographic area to be served by state government and the costs associated with networking over wide areas;

c. The existing investments in information technologies to which end-user agencies are already committed;

d. The fact that many managers are reluctant to take risks when confronting an uncertain environment characterized by more limited budgets and a technology marketplace that is dynamic.

Nevertheless, states in this sample are overcoming many of these constraints and are reorganizing and redefining their management strategies in ways that are consistent with their political and organizational cultures and management capabilities. Coherent strategies for managing information resources and technology are evident in every state in the sample. Given the alternatives for technology use available since the microcomputer, it no longer makes sense to discuss states as being centralized or decentralized in terms of operations alone. States have adopted operational strategies that have both characteristics depending on the application and the cost of providing the service locally or in a

consolidated data center. Similarly, every state is evolving long-term strategies (although plans are subject to change based on contingencies in funding or changes in the marketplace) that respect the integrity of current investments in IT and the expertise of line agencies. The experiences related in the study demonstrate that it is possible to develop coherent strategies for managing information resources and technology and to address the variety of constraints that state governments ordinarily face in trying to improve information processing and their ability to deliver services.

APPENDIX 1

OPPORTUNITIES FOR FURTHER RESEARCH

In considering questions for further research one should remember that the scope of the study was limited to only seven states and primarily to information technology management strategies adopted by central state governments. State and federal policy-makers would benefit from a more detailed study, broader in scope and encompassing a larger sample of states. Such a study would be more adequate to confirm the reliability of the conclusions drawn from the analysis reported here. However, the study which has led to this report begs a number of other issues worthy of consideration.

1. Clearinghouse of Innovations in Information Technology Management and Applications Development

Clearly states are relying on information technology to continue to support service delivery at current or increased levels in the face of tighter budgets and limited increases in staff size. State officials are constantly in search of innovations that will improve IT operations and management. Many have probably established their own information communications networks with counterparts in other states; but there is the potential need for a more systematic approach to identifying, classifying, and disseminating information on innovative applications of and management strategies for information technologies. State officials are working under severe financial constraints. At the same time, advances in technology are increasing the technical options to which these officials can avail themselves. The search for solutions as well as simply "keeping current" is a costly, time consuming process. A central clearinghouse for information

might be a cost-effective alternative to the state official's lone search for advice from peers in other states. Whether there is support for such a service remains to be seen. Where such support should be located is unclear. There are a number of options including, the National Association of State Information Systems (NASIS) of the Council of State Governments, a university-based clearinghouse, a federally-operated clearinghouse and a clearinghouse maintained strictly by the private sector. Of special importance is the role of the federal government in adopting anyone of these options from the standpoint of providing funding and from the standpoint of including the federal government as a subscriber to the clearinghouse.

2. Training in the Use of Information Technology

A number of states reported in this study have already invested substantial resources in developing facilities dedicated especially to training of end-users in operating terminals, word processors and microcomputers. However, it is not clear that this trend is replicated nationwide; indeed, it is not replicated by every state in the sample. As technology becomes more and more a part of the way work is conducted in state government agencies, boards and commissions end-user training takes on added significance. Behavioral studies of IT implementation conclude that adequate training of end-users is essential if workers are going to overcome any fear they might have of technology and if they are going to use it. Both the federal government and states share an interest in developing a workforce that is technology literate; and end-user training is certainly one way to achieve this goal. That there is a role for the federal government in providing funding or supporting training services or supporting the development of training facilities in state governments is worthy of examination. At the very least, government officials have got to recognize that end-user training in the use of computer-based and communications technologies, for which states are investing substantial sums of money cannot be treated lightly. There is ample evidence to support the claim that training is essential to overcoming resistance to technology and enhance the productive use of technology.

APPENDIX 2

SURVEY QUESTIONNAIRE

STATE: _____ DATE: _____
NAME: _____ PHONE#: _____
TITLE: _____
AGENCY: _____

A. PLANNING

1. Does the state have a strategic plan for IT?
   yes _____
   no _____

   If yes, who is responsible for formulating and administering the State IT Plan? To whom are IT planners accountable?

   _____
   _____
   _____
   _____

2. If yes, please describe the strategic planning process for IT

   _____
   _____
   _____
   _____
   _____
   _____

2a. How comprehensive is the strategic plan? (What is the scope of technologies covered?)

   _____
   _____
   _____

2b. What is the time horizon covered by the strategic plan?

_____

2c. Are agencies responsible for developing their own IT plans?
yes_____
no _____

2d. How are agencies held accountable to the provisions of the State IT plan?

_____
_____
_____
_____

2e. What specific procedures for designing and implementing IT systems are described in the plan?

_____
_____
_____
_____

3. Which technologies are covered in the State's Plan?

_____
_____
_____

4. Why did the State take the approach to planning that it has?

_____
_____
_____

Was the planning process the result of some initiative by the
Governor? _____
Legislature? _____

B. OPERATIONS AND TRAINING

1. Are there agencies which have introduced office automation?
yes_____
no _____

1a. Please describe the OA configurations in state government

_____
_____
_____

Can you identify two or more of the more innovative users of office automation?

	AGENCY		CONTACT PERSON
1.	_____	1.	_____
2.	_____	2.	_____
3.	_____	3.	_____

2. Does the state government have a formal, written policy on IT security? (Hardware and software, data security)
yes _____
no _____

If yes,, what is it?_____
_____
_____
_____

3. Is money appropriated for IT security as a specific use item in the state budget?
yes _____
no _____

4. Are you aware of any examples where state agencies are using information technology to actually deliver a service to the public?
yes _____
no _____

If yes,

	AGENCY	EXAMPLE
1.	_____	_____
2.	_____	_____
3.	_____	_____

5. Is there an information locator system? (An automated directory of information resources (analagous to a card catalogue or telephone director) which does not contain the actual database but "points" the user to the pertinent information.)
yes _____
no _____

6. Does the state have a policy on training?
   yes _____
   no _____

7. Does the state have an organization specifically vested with responsibility for IT training?
   yes _____
   no _____

   Is there a contact person for training?
   _____

8. What is the instructional focus of IT training in the state. (See if respondent has inventory of training courses for distribution). Is training merely concerned with the functional application of IT or does the state also have training classes in the management of IT uses, ergonomic issues, etc?
   _____
   _____
   _____
   _____
   _____
   _____

C. CONTROLS

1. What technical controls for IT, such as state standards for communications, exist?
   _____
   _____
   _____
   _____
   _____

2. Are IT planning, procurement and audit processes employed as control mechanisms to enforce IT policies?
   _____
   _____
   _____
   _____
   _____

3. What is the organizational structure for IT management in state government?
   _____
   _____
   _____
   _____
   _____

Why is the structure designed in this way?

_____
_____
_____
_____
_____

D. GENERAL COMMENTS

1. What political, economic, or organizational factors do you think have most influenced the approach that your state has taken toward IT management? (Rank)

   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

2. Which of these factors are critical to ensuring a coherent management structure for IT? (Rank)

   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

3. Can you recommend any other individuals with particular insight into any of the issues we have mentioned?

NAME	AGENCY	PHONE NUMBER

FOOTNOTES

1 The National Association of State Information Systems (NASIS) publishes an annual report entitled Information Systems Technology in State Government. The report summarizes various classes of data supplied by the states. IT coordination and control, computer inventory, personnel, training, difficulties in EDP management, formalized plans and documentation, intergovernmental information systems relationships, applications, finding data security and privacy, and examples where applications were transferred between states.

2 California, Office of Information Technology, Statewide Personal Computer Policy, p. 1.

3 California, Office of Information Technology, Strategic Implementation Plan, p. 15.

BIBLIOGRAPHY

GENERAL

National Association for a State Information Systems. Information Systems Technology in State Government, 1982-1983. Lexington, Kentucky.

U. S. Office of Management and Budget, Management of Federal Information Resources; Notice and Request for Public Comment. March 15, 1985.

Vorlander, Carl W., Executive Director, National Association for State Information Systems. Interview. October 10, 1984.

Vorlander, Carl W. "State Information Systems," Book of the States, 1982-1983, Council of State Governments.

CALIFORNIA

Department of Fair Employment and Housing. Annual Report 1983-1984.

Department of Fair Employment and Housing. Summary of Current Equipment and Proposed EDP Projects.

Department of Finance, Office of Information Technology. "Statewide Personal Computer Policy." 15 February 1985.

Department of Finance, Office of Information Technology, Strategic Implementation Plan, November 1984.

Governor's Budget Summary 1985-1986

California Information Technology Advisory Board. Information Technology in California State Government. December 1982.

California. Section 4820 of the State Administrative Manual. "State Information Management Policy."

California. Section 4819.3 of of the State Administrative Manual. "State Information Management Authority and Responsibility."

Framework to Develop Computer Information Public Access Policy. Prepared by Touche Ross and Company and EDP Audit Controls, Inc., for the Office of Information Technology, Department of Finance. January 1, 1985.

Kneedel, Harold, Assistant Director, Law Enforcement Data Center. Interview, 27 March 1985.

Kolodney, Steve, Director, Office of Information Technology, Department of Finance. State of California Interview, November 9, 1984.

Luallin, Charlotte, Associate Program Analyst, Department of Fair Employment and Housing, Interview, 9 April 1985.

Reader, Betty, Deputy Director for Administrative Services, California Department of Fair Employment and Housing. Interview, 4 April 1985.

FLORIDA

Davies, Thomas R. and Hale, Mike, "Implementing a Policy and Planning Process for Managing the Use of Information Technology Resources." Paper presented at the joint national meeting of the 1984 Operations Research Society of America and the Institute of Management Science, Dallas, Texas, 28 November 1984.

Florida Division of Electronic Data Processing. "Resolution on Data Processing Adopted by the Governor and Cabinet on February 16, 1982." A memorandum to all agency heads and data center directors, 28 October 1982.

Final Report of the Joint Select Committee on Electronic Data Processing, 25 July 1983.

Overview of Computer Security. A Report of the Florida Legislature, Joint Committee on Information Technology Resources, January 1984.

Remote Computer Access to Public Records. A Report of the Florida Legislature, Joint Committee on Information Technology Resources, January 1985.

Hale, Michael, Executive Director, Information Resources Commission, State of Florida. Interview, 30 November 1984.

Levine, Edwin A., Staff Director of the Joint Legislative Committee on Information Technology Resources. 26 March 1985.

MINNESOTA

Abraham, Nancy, Assistant Commissioner, Department of Administration Information Services Bureau, State of Minnesota, Interview, November 5, 1984.

Dethmers, Richard, "Finding the Issues in Telecommunications," Minnesota Journal, September 18, 1984, p. 7.

"Managing the Information Services of Minnesota State Government." An unpublished report by the Department of Administration, State of Minnesota, September 1983.

Minnesota, Department of Administration, Information Services Bureau. "EDP Applications Policy," May 26, 1981.

Minnesota, Department of Administration, Information Services Bureau. "EDP Data Policy," May 26, 1981.

Minnesota, Department of Administration, Information Services Bureau. "State EDP Data Security Guidelines." October 1983.

Minnesota, Department of Administration, Information Services Bureau. "EDP Equipment Policy," May 26, 1981.

Minnesota, Department of Administration, Information Services Bureau. "EDP Operations Policy," May 26, 1981.

Minnesota, Department of Administration, Information Services Bureau. "EDP Personnel Policy," May 26, 1981.

Minnesota. 1985-1987 Biennial Budget.

Minnesota, Minnesota Laws, Section 65, (16 B 01).

Minnesota. Report of the Governor's Blue Ribbon Committee on Information Policies. November 1984.

NEW YORK

Heinson, John, Director of Telecommunications, State of New York, Interview, December 5, 1984.

Fisk, Paul. Division of the Budget, Interview, 12 March 1985.

Lynch, Peter, Deputy Director, Division of the Budget, State of New York, November 30, 1984.

Office of General Services, Division of Telecommunications. A Management Plan for New York State Government Telecommunications, Facilities, January 1982.

SOUTH CAROLINA

Black, Sena. The Information Technology Planning Process In South Carolina State Government. Volume I: Recommended Policies and Procedures and Volume II: A Draft Manual for State Agencies. Institute of Information Management, Technology and Policy, University of South Carolina, February 1982.

Black, Sena H. and Kettinger, William J., The Procurement of Telecommunications in South Carolina State Government. Institute of Information Management, Technology and Policy, University of South Carolina, September 1981.

Black, Sena H.; Kettinger, William J.; and Marchand, Donald A., Managing and Accounting for Information and Communication Resources in South Carolina State Government. Institute of Information Management, Technology and Policy, University of South Carolina, April 1981.

Black, Sena H.; Schechter-Schoeman, Sara; Ayres, Q. Whitfield; Kresslein, John C.; and Sifford, Paul. Information Resource Management: A Statewide Strategy. Institute of Information Management, Technology and Policy, University of South Carolina, April 1983.

Division of Information Resource Management, Information Technology Planning Manual for State Agencies in South Carolina State Government. Columbia, South Carolina, April 1982.

Division of Information Resource Management, Office Automation Standards, Columbia, South Carolina, January 1984.

Division of Information Resource Management, State Plan on Office Automation, Columbia, South Carolina, January 1983.

Division of Information Resource Management, State Plan on Technology. Columbia, South Carolina, October 1983.

Kettinger, William J., The State Office Automation Pilot Study: Progress Report 1. Institute of Information Management, Technology and Policy, University of South Carolina, January 1983.

Kettinger, William J. and Kresslein, John C., An Initial Evaluation of Productivity Benefits Achieved From SOAPS: Progress Report 2. Institute of Information Management, Technology and Policy, University of South Carolina, July 1983.

Kettinger, William J. and Kresslein, John C., Personal Computers in State Government. Institute of Information Management, Technology and Policy, University of South Carolina, May 1984.

Marchand, Donald A., A Manager's Guide For Implementing Information Resource Management (IRM) In A State Agency. Institute of Information Management, Technology and Policy, University of South Carolina, June 1984.

Schechter-Schoeman, Sara, The Foundations of Data Confidentiality in South Carolina: Statutes and Analysis. Institute of Information Management, Technology and Policy, University of South Carolina, June 1983.

Schechter-Schoeman, Sara; Muthuswamy, Balakrishnan; Donahue, Joesph; Kerschberg, Larry; and Sen, Arun, An Information Locator System for South Carolina: Feasibility Study and Implementation Strategy. Institute of Information Management, Technology and Policy, University of South Carolina, June 1984.

Schechter-Schoeman, Sara; Williams, Jane; and Killingsworth, Brenda, Security Contingency Planning and Auditing. Institute of Information Management, Technology and Policy, University of South Carolina, July 1983.

Williams, N. Jane, An Information Resources Training Program for South Carolina State Government: A Recommended Course of Action. Institute of Information Management, Technology and Policy, University of South Carolina, July 1983.

TEXAS

Rutherford, George, Director of Telecommunications Services, State Purchasing and General Services Commission. Interview, 25 March 1985.

Texas, Seven Texas Register 1173, Chapter 201, Acquisition of Automated Information Systems, March 19, 1982.

Vernon's Annotated Revised Civil Statutes of the State of Texas. Volume 12B, Article 4413 (32h), Automated Information Systems Advisory Council.

Winston, Charles, Executive Director, Automated Information Systems Advisory Council, State of Texas, Interview, November 5, 1984.

VIRGINIA

Virginia, A memorandum to agency data processing managers entitled "Commonwealth of Virginia Data Processing Policies and Standards Manual, Volume I," August 1, 1982.

Virginia, A memorandum to heads of all state agencies and institutions entitled "The Commonwealth of Virginia's Information Management Strategies for the '80's, November 15, 1982.

Virginia, Department of Management Analysis and Systems Development. Data Processing Guidelines for Information Security.

Moye, Hal, Computer Systems Chief Engineer, Department of Information Technology, State of Virginia, Interview, 9 November 1984.

"Office Automation: A Pilot Project." An Unpublished report by the Department of Computer Services, Commonwealth of Virginia, January 1984.

Wathington, Lee, Data Systems Manager, Virginia Department of Agriculture and Consumer Services. Interview, March 25, 1985.